

CLAIMS

I claim:

1. A method for providing environmental monitoring and control, the method comprising:

providing a plurality of wireless nodes, the plurality of wireless nodes includes a plurality of sensor nodes and a plurality of actuator nodes, each wireless node including a wireless transceiver, a processor and one of a sensor device or an actuator device;

sending a message from a first wireless node to a second wireless node through wireless communication; and

processing the message at the second wireless node,

wherein the message comprises sensor data or a control command operative to control the sensor device or the actuator device in the second wireless node.

2. The method of claim 1, wherein the second wireless node comprises a sensor node and the message comprises a command to request sensor data, the method further comprises:

collecting sensor data at the second wireless node; and

transmitting the sensor data to a destination node in accordance with the message.

3. The method of claim 1, wherein the second wireless node comprises an actuator node and the message comprises a control command for controlling the actuator device, the method further comprises:

controlling the actuator device in response to the message.

4. The method of claim 1, wherein sending a message from a first wireless node to a second wireless node through wireless communication comprises sending a request message from the first wireless node being an actuator node to the second wireless node being a sensor node, the method further comprising:

transmitting sensor data from the second wireless node to the first wireless node upon receipt of the request message.

5. The method of claim 1, wherein sending a message from a first wireless node to a second wireless node through wireless communication comprises:

sending the message from a first wireless node to a third wireless node; and

sending the message from the third wireless node to the second wireless node,

wherein the third wireless node comprises a sensor node or an actuator node.

6. The method of claim 5, wherein the plurality of wireless nodes further includes a repeater node for relaying messages between the wireless nodes, the third wireless node being the repeater node.

7. The method of claim 1, wherein the first wireless node comprises a sensor node and the second wireless node comprises an actuator node, and wherein sending a message from a first wireless node to a second wireless node through wireless communication comprises:

collecting sensor data at the sensor node;
processing the sensor data to generate a control command; and

sending a message containing the control command to the second wireless node for controlling the actuator device of the second wireless node.

8. The method of claim 1, further comprises:

 sending a message including sensor data from a third wireless node to the second wireless node, the first, second and third wireless nodes being sensor nodes;

 receiving messages including sensor data at the second wireless node from the first and the third wireless nodes;

 processing the sensor data to generate a control command for a destination actuator node; and

 sending the control command to the destination actuator node.

9. The method of claim 1, wherein the first wireless node and the second wireless node comprise a first and a second actuator node, the first wireless node sending the message to the second wireless node for coordinating a sequence for actuating the respective actuator device.

10. The method of claim 1, further comprising:

 transmitting messages from the plurality of sensor nodes to one or more wireless nodes on a periodic time basis, the messages comprising sensor data or control commands.

11. The method of claim 1, further comprising:

 transmitting messages including sensor data from all of the plurality of sensor nodes to one or more wireless nodes;

 processing the sensor data at the one or more wireless nodes, wherein each of the one or more wireless nodes

processes the sensor data associated with the respective wireless node; and

generating control commands at the one or more wireless nodes based on the associated sensor data.

12. The method of claim 1, further comprising:

turning off the wireless transceivers of the plurality of wireless nodes; and

turning on the wireless transceivers of the plurality of wireless nodes synchronously to transmit and receive messages.

13. The method of claim 12, wherein turning on the wireless transceivers of the plurality of wireless nodes synchronously comprises:

turning on the wireless transceivers of the plurality of wireless nodes based on a predetermined time schedule.

14. The method of claim 12, wherein turning on the wireless transceivers of the plurality of wireless nodes synchronously comprises:

turning on the wireless transceivers of the plurality of wireless nodes periodically to listen for a synchronization command; and

turning on the wireless transceivers of the plurality of wireless nodes to transmit and receive messages when a synchronization command is received.

15. The method of claim 1, further comprising:

sending an acknowledgement message from the second wireless node to the first wireless node.

16. The method of claim 1, wherein the first wireless node comprises a sensor node, the method further comprising:

collecting sensor data from the sensor device of the first wireless node; and

sending the message including the sensor data to the second wireless node as sensor data is collected.

17. The method of claim 1, wherein the first wireless node comprises a sensor node, the method further comprising:

collecting sensor data from the sensor device of the first wireless node;

integrating sensor data over a period of time; and

sending the message including the integrated sensor data to the second wireless node.